



THE UNIVERSITY *of* EDINBURGH

## Edinburgh Research Explorer

# Intergenerational social mobility and subjective wellbeing in later life

### Citation for published version:

Iveson, MH & Deary, IJ 2017, 'Intergenerational social mobility and subjective wellbeing in later life', *Social Science & Medicine*, vol. 188, pp. 11-20. <https://doi.org/10.1016/j.socscimed.2017.06.038>

### Digital Object Identifier (DOI):

[10.1016/j.socscimed.2017.06.038](https://doi.org/10.1016/j.socscimed.2017.06.038)

### Link:

[Link to publication record in Edinburgh Research Explorer](#)

### Document Version:

Peer reviewed version

### Published In:

Social Science & Medicine

### General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

### Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact [openaccess@ed.ac.uk](mailto:openaccess@ed.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.



**Intergenerational social mobility and subjective wellbeing in later life.**

**Matthew H. Iveson<sup>1,2</sup> and Ian J. Deary<sup>1</sup>**

<sup>1</sup>The Centre for Cognitive Ageing and Cognitive Epidemiology, The University of Edinburgh, Edinburgh, UK; <sup>2</sup>The Administrative Data Research Centre Scotland, Edinburgh, UK

**Word Count:** 7974 words

**Correspondence to:**

Dr Matthew H. Iveson, The Centre for Cognitive Ageing and Cognitive Epidemiology, The University of Edinburgh, 7 George Square, Edinburgh, EH8 9JZ, United Kingdom

## **Abstract**

Whereas a great deal of literature has been devoted to investigating the link between intergenerational social mobility and health, the few studies that have examined the association between social mobility and life satisfaction have produced conflicting findings. In the present study, we attempt to rectify several shortcomings common to previous work by examining the association between intergenerational social mobility and both life satisfaction and self-rated health as measured in later-life. Our sample consisted of individuals born in Scotland in 1936, who took part in the Scottish Mental Survey 1947 and were subsequently followed-up into later-life. Regression analyses demonstrated that satisfaction with life at age 78 was not significantly predicted by childhood or adulthood socioeconomic status, or by the amount of social mobility experienced from parental occupational social class. In contrast, self-rated health at age 78 was significantly predicted by adult socioeconomic status and by education, but not by social mobility from parental occupational social class. These results suggest that efforts to promote upwards social mobility may not result in better subjective wellbeing, despite the apparent benefits for health.

**Keywords:** Social mobility, SES, life satisfaction, health

## **Highlights**

- Life satisfaction at age 78 was not predicted intergenerational social mobility.
- Self-rated health at age 78 was predicted by education and by adult SES.
- Upwards social mobility may improve health, but not subjective wellbeing.

## Introduction

Improving the social class of citizens, particularly between generations, has been the focus of many successive governments (e.g., “Opening Doors, Breaking Barriers: A Strategy for Social Mobility”, UK Government; “State of the Nation 2016: Social mobility in Great Britain”, Social Mobility Commission; “Equally Well Review 2010”, Scottish Government). This has been driven by the apparent assumption that those who increase their socioeconomic status (SES) – defined as an individual’s social prestige and access to material and social resources – or who experience upwards intergenerational social mobility will be happier and more satisfied with their lives. For example, in the foreword of the most recent (2016) UK State of the Nation report published by the Social Mobility Commission, it is suggested that “higher social mobility... can be a rallying point to prove that modern capitalist economies can create better, fairer and more inclusive societies” (“State of the Nation 2016: Social mobility in Great Britain”, Social Mobility Commission, p. xiii). Consistent with this assumption, those nations with increasing income, Gross Domestic Product and standards of living are also those likely to show increases in self-rated life satisfaction (Diener, Kahneman, Tov, & Arora, 2010; Diener, Ng, Harter, & Arora, 2010; Diener, Tay, & Oishi, 2013). Whether this is driven by social mobility, and whether this association holds on an individual level, remains unclear.

The assumption that upwards social mobility may lead to better subjective wellbeing is probably motivated in part by the relative success over the last few decades of studies demonstrating an association between higher SES and better health outcomes (e.g., Angell, 1993; Adler et al, 1994; Marmot & Shipley, 1996; Davey Smith, Hart, Blane, Gillis, & Hawthorne, 1997). Indeed, this association has been replicated across different countries (e.g., Feinstein, 1993; Goldman, 2001). Social mobility has similarly been associated with health outcomes, with upwards mobility relative to parental social class (intergenerational social

mobility) associated with reduced mortality (Mare, 1990), reduced morbidity (Marmot, Shipley, Brunner, & Hemingway, 2001; Heraclides & Brunner, 2010), improved cognitive functioning (Turrell et al., 2002), better self-rated health (Power, Manor, & Matthews, 1999), and better health behaviours (Lynch, 2000). In one such study, Luo and Waite (2005) demonstrated that intergenerational social mobility predicted physical and psychological health in later-life (aged 50+). For those individuals with lower childhood SES, upwards mobility predicted better health outcomes than did stable or downwards mobility. These results suggest that later-life health can be improved, and health inequalities reduced, if those from low SES backgrounds can attain higher SES by adulthood. Furthermore, this supports previous assertions that upwards social mobility compensates for the early-life disadvantages which would otherwise increase the risk of ill-health (Graham, 2002).

Whereas upwards intergenerational social mobility is associated with better health outcomes, it is relatively unclear whether upwards social mobility similarly predicts better subjective wellbeing. Just as with health (Feinstein, 1993; Luo & Wen, 2002; Evans & Kim, 2010), inequalities in life satisfaction may result from the unequal distribution of risks and resources – such as access to health or social services, positive working conditions, and recreational opportunities – across the social classes. However, findings regarding the association between social mobility and life satisfaction have been mixed. Marshall and Firth (1999) examined cross-sectional social survey data from several countries, covering both life satisfaction and occupational information. They observed that social mobility, upwards or otherwise, was not strongly associated with changes in life satisfaction. However, in a longitudinal study covering UK and Swiss panel data, Hadjar and Samuel (2015) observed that upwards intergenerational social mobility was associated with lower life satisfaction, though only in the UK sample. In contrast, in an American cross-sectional sample, Nikolaev and Burns (2014) observed that

upwards intergenerational social mobility was associated with higher self-rated happiness, and that downwards mobility was associated with lower self-rated happiness. Zhao, Li, Heath, and Shryane (2017) similarly observed that upwards intergenerational social mobility was associated with higher subjective wellbeing in a Chinese cross-sectional sample; however, they did not observe a significant association between downwards mobility and wellbeing.

This confusion regarding the association between social mobility and life satisfaction is supplemented by several limitations common to previous work. Firstly, the majority of previous studies (e.g., Marshall & Firth, 1999; Zhao et al., 2017) have used somewhat coarse measures of social mobility, such as transitions between working class and salariat class, and have largely ignored the amount of social mobility (i.e., the degree of class change) experienced. One of the few studies to have examined the contribution of the amount of social mobility observed no significant association between the degree of class change and self-rated happiness, albeit in a cross-sectional sample (Zang & de Graaf, 2016). Secondly, by using samples formed of individuals born at different times, previous studies have introduced error associated with historical economic and social factors that are not shared by all individuals. For example, in the UK, those born in the early 20<sup>th</sup> century faced more severe shortages in employment (e.g., exposure to the inter-war economic depression) than those born in the mid-20<sup>th</sup> century (Lindsay, 2003), and so these individuals would likely differ in their SES trajectory. Similarly, female participation in the workforce has increased across the 20<sup>th</sup> century (Lindsay, 2003), and so women born later are more likely to be economically active. Thirdly, by surveying individuals at different ages, previous studies have examined life satisfaction in individuals that differ in their exposure to potential social mobility; older individuals have had more time to accumulate social position than younger cohort members.

In the present study, we examine whether those whose own social class has improved relative to that of their parents are more likely to be satisfied when they reflect on their lives, and whether the amount of social mobility experienced predicts self-rated life satisfaction. Note that in the present study we use occupational status as an indicator of SES, as it captures both social prestige and access to material resources (see Krieger, Williams, & Moss, 1997). Importantly, we examine social mobility within a cohort of Scottish individuals born in 1936, thus avoiding potential differences in economic environment or exposure to changes in socioeconomic status. Alongside life satisfaction, we also examine the association between the amount of social mobility and self-rated health. Again, the association between upwards social mobility and health outcomes has been well-replicated (e.g., Power et al., 1999; Marmot et al., 2001). However, whether the amount of change in SES matters for health outcomes is unclear. In particular, we examine the association between intergenerational social mobility and both life satisfaction and health in later-life, around age 78. This means that these individuals have had a lifetime within which to experience social mobility from their parents' social status. Furthermore, as exposure to SES-related risks accumulates over the life course, middle- and older-aged adults show the strongest SES-health relationship (House, Kessler, & Herzog, 1990). Older age may likewise be the ideal time to assess the association between SES and life satisfaction, as individuals will have lived full lives with which to be satisfied or not.

## **Methods**

### Study Sample

A total of 7383 individuals (3723 females), all of whom were born in Scotland in 1936, were included in the study. These individuals took part in the Scottish Mental Survey 1947 (The

Scottish Council for Research in Education, 1949), in which almost all children born in Scotland in 1936 and attending school in Scotland on the 4<sup>th</sup> of June 1947 completed a test of general cognitive ability. These individuals were then followed-up in later-life as part of two separate projects: i.e., the Lothian Birth Cohort 1936 (Deary et al., 2007), and the 36-Day Sample Study (Brett & Deary, 2014, Deary & Brett, 2015). These two studies have been combined here due to their similarity in design, timescale and available variables. This sample consisted of individuals from the 36-Day Sample of the Scottish Mental Survey 1947 (N = 6292; The Scottish Council for Research in Education, 1953) and the Lothian Birth Cohort 1936 (N = 1091; Deary et al., 2007).

The combined sample of 7383 individuals was further narrowed to include only those with complete measures of social class (parental and own), life satisfaction, self-rated health, and childhood cognitive ability (Figure 1). Individuals with missing adult occupational social class were removed as they either did not complete the occupation questionnaire at follow-up (N = 3087), or they had died (N = 2298) or become otherwise untraceable by follow-up (N = 313). At each step, the removed individuals demonstrated significantly lower childhood cognitive ability than the retained sample (all  $p$ s < 0.05), with the exception of those with a missing life satisfaction measure ( $p$  = 0.08). Similarly, removed individuals spent significantly fewer years in full-time education than the retained sample (all  $p$ s < 0.001), with the exception of those with a missing health measure ( $p$  = 0.43) and those with a missing measure of childhood cognitive ability ( $p$  = 0.05). The majority of individuals removed at each stage originated from the middle ('Skilled') parental occupational social class. A full comparison of demographic characteristics between the full combined sample and both the analytic sample and removed individuals is presented in the supplementary material. The final sample carried forward to the analyses consisted of 1255 individuals.



--- Insert Figure 1 around here ---

### Assessments

Both the 36-Day Sample and the Lothian Birth Cohort 1936 provided early-life measures of cognitive ability and socioeconomic status, alongside later-life measures of full-time education, socioeconomic status, satisfaction with life and general health. Although assessed in the same way, the time point at which certain measures were collected differed between the two samples, particularly for those collected at later-life follow-up. For the Lothian Birth Cohort 1936, individuals took part in the Scottish Mental Survey 1947 (The Scottish Council for Research in Education, 1949) and then received later-life follow-up in a clinical research facility between 2004 and 2010. For the 36-Day Sample, individuals also took part in the Scottish Mental Survey 1947 (The Scottish Council for Research in Education, 1949), but then received two types of follow-up: a sociological survey in 1947 (Scottish Council for Research in Education, 1949), and a later-life follow-up by post and telephone in 2014. Again, other than differences in timing, measures of full-time education, socioeconomic status, satisfaction with life and general health were collected in the same way, and so were treated as consistent when combining the two samples.

#### *Cognitive ability*

As part of the Scottish Mental Survey 1947, all individuals completed the Moray House Test No. 12 test of intelligence (MHT; The Scottish Council for Research in Education, 1949) on the

4<sup>th</sup> of June 1947, around the age of 11 years. Raw scores could range from 0 to 76, and were converted here into IQ-type scores (Mean = 100, SD = 15) for use as a measure of childhood cognitive ability.

#### *Full-time Education*

The number of complete years spent in full-time education was self-reported at later-life follow-up as part of a detailed questionnaire. As participants in the 36-Day Sample received this follow-up later in their lives (2014) than participants in the Lothian Birth Cohort 1936 (from 2004 to 2007), they had more time to accrue full-time education. However, on formal comparison, the two samples did not significantly differ in terms of the number of years spent in full-time education ( $p = 0.76$ ).

#### *Occupational social class and intergenerational social mobility*

Social class in childhood was measured using the occupation of the father. For the 36-Day Sample, father's occupation was recorded during the sociological schedule administered in 1947 (Scottish Council for Research in Education, 1949). For members of the Lothian Birth Cohort 1936, father's occupation was recorded at the time of the follow-up questionnaire (from 2004 to 2007). For both samples, father's occupation was categorised into one of 5 occupational social classes according to the 1950 United Kingdom's classification index (General Register Office, 1956). Classes ranged from unskilled, manual occupations (class V) to professional occupations (class I). These 5 categories were then reversed, so that higher categories represented more professional occupations.

Adulthood social class was measured using the individual's own highest-status occupation, as recorded in the later-life follow-up questionnaire (Lothian Birth Cohort 1936: recorded from 2004 to 2007; 36-Day Sample: recorded in 2014). For both samples, these occupations were

classified into 6 occupational social classes according to the 1980 United Kingdom's classification index (Office of Population Censuses and Surveys, 1980). Social classes of IIIM (Skilled, Manual occupations) and IIIN (Skilled, Non-Manual occupations) were combined into one social class (III) to coincide with previous classification indexes. The resulting 5 categories were then reversed, so that higher categories represented more professional occupations.

The amount of intergenerational change in occupational social class was calculated for both samples by subtracting childhood social class (reversed) from adulthood social class (reversed). Change in social class from that of the father ranged from -3 (i.e., 3 classes lower in adulthood than in childhood) to +4 (i.e., 4 classes higher in adulthood than in childhood). No change in occupational social class between childhood and adulthood (i.e., stable) produced a score of 0. Note that no individual within the present sample showed an intergenerational change of -4, indicating a move from the highest parental social occupational social class in childhood to the lowest own occupational social class in adulthood.

#### *Satisfaction with life*

As part of the later-life follow-up, all participants completed the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The SWLS has been shown to have good internal consistency, ranging from an alpha of 0.79 to 0.89, as well as good test-retest reliability, ranging from a coefficient of 0.50 to 0.84 (Pavot & Diener, 1993). Lothian Birth Cohort 1936 members completed the SWLS between 2007 and 2010. Members of the 36-Day Sample completed the SWLS in 2014. The SWLS contains 5 statements regarding how content an individual is with their life (e.g., "In most ways my life is ideal"), and participants are required to rate how much they agree with each statement on a scale of 1 (strongly disagree) to 7 (strongly agree). The SWLS total score (max = 35) is calculated by adding together the

responses from all 5 statements; higher scores indicate that an individual is more satisfied with their life.

### *Self-rated health*

At later-life follow-up, all participants provided self-rated health in response to the question “How would you rate your current health”. Responses were given using a 5-point Likert scale (“Very Poor” to “Very Good”). Lothian Birth Cohort 1936 members provided these ratings between 2007 and 2010. Members of the 36-Day Sample provided these ratings in 2014.

### Statistical analyses

The analyses focused on assessing the association between social mobility and later-life health and satisfaction. As a precursor, we first described the sample in terms of their self-rated health, life satisfaction, and socioeconomic trajectories. We then conducted the analyses in two stages. In the first stage we examined whether socioeconomic status in general could predict later-life health and satisfaction, as well as the relative importance of childhood and adulthood socioeconomic status. In the second stage, we examined whether the amount and direction of change between childhood and adulthood socioeconomic status, i.e., whether the degree of intergenerational social mobility, could predict later-life outcomes, and whether this association survives adjusting for important covariates.

In the first stage of the analyses, regression models were created to predict health and satisfaction, using childhood and adulthood occupational social class as predictors. These two predictors were entered together to assess their mutually-adjusted contribution to later-life outcomes. As SWLS total score is a continuous variable, linear regression models were

constructed. As self-rated health is an ordinal variable, an ordered logistic regression model was constructed.

In the second stage of the analyses we instead used as the exposure the amount of intergenerational change in occupational social class to predict self-rated health (ordered logistic regression) or SWLS total scores (linear regression). Only 2 individuals had a -3 change in social class (see Table 2), and were therefore removed from this stage of the analyses. For each of the two outcomes, three linear models were created. The first model included only the amount of change in social class (ranging from -2 to +4) as a predictor. In the second model, a main effect of sex was included as a predictor alongside the amount of change in social class, with a sex by social class interaction term also included. In the third model, main effects of years of full-time education and MHT IQ score were added to the second model. The association between the amount of intergenerational change in social class and later-life outcomes was therefore assessed unadjusted (model 1), adjusted for and stratified by sex (model 2), and further adjusted for education and childhood intelligence (model 3).

Analyses were conducted in R (v3.3.1; R Core Team, 2016) using the 'psych' (v1.6.6; Revelle, 2016), 'MASS' (v7.3-45; Venables & Ripley, 2002), and 'ggplot2' packages (v2.1.0; Wickham, 2009). Statistical tests were not adjusted for multiple comparisons.

## **Results**

### Sample description

We first sought to describe the sample and their socioeconomic origins (from childhood) and destinations (from adulthood). Table 1 shows adult occupational social class according to the

father’s occupational social class during childhood. The majority of individuals either remained stable or changed their social class by one or two classes. There were, however, very few individuals whose own occupational social class at follow-up was unskilled (see white cells). Table 2 shows the descriptive statistics for the sample according to sex. The distribution of self-rated health scores and SWLS total scores are shown in Figure 2.

---Insert Table 1 around here---

---Insert Table 2 around here---

---Insert Figure 2 around here---

Self-rated health scores and SWLS total scores were significantly correlated,  $r_s = 0.28$ , 95% CI [0.23, 0.34],  $p < 0.001$ , such that higher health ratings were associated with better life satisfaction. In a linear model predicting the amount of intergenerational change in occupational social class, both higher MHT IQ scores and more years of education, mutually-adjusted, were associated with larger upwards shifts in SES between childhood and adulthood ( $p = 0.021$  and  $p = 0.026$ , respectively).

Socioeconomic status and health and satisfaction with life

In the first stage of the analyses we examined the association between socioeconomic status at a given time point (childhood or adulthood) and later-life health and life satisfaction.

#### *Self-rated health*

Ordered logistic regression (N = 1255) was conducted to examine the mutually-adjusted association between parental and own adulthood SES and self-rated health. Higher adulthood SES was associated with higher self-rated health, OR = 1.22, 95% CI [1.07, 1.38],  $p = 0.002$  (Figure 3B). There was no significant association between self-rated health and childhood SES, OR = 1.06, 95% CI [0.95, 1.19],  $p = 0.310$  (Figure 3A).

#### *Satisfaction with life*

The mutually-adjusted contributions of childhood and adulthood SES to satisfaction with life was examined using linear regression (N = 1255). Own SES in adulthood showed a significant association with satisfaction with life, such that higher occupational social classes predicted higher SWLS total scores, OR = 1.49, 95% CI [1.01, 2.21],  $p = 0.043$  (Figure 3D). This association does not survive adjusting for multiple comparisons. There was no significant association between childhood SES and satisfaction with life, OR = 1.00, 95% CI [0.70, 1.41],  $p = 0.987$  (Figure 3C).

---Insert Figure 3 around here---

#### Intergenerational social mobility, health, and life satisfaction

In the second stage of the analyses, we examined the association between the amount and direction of intergenerational change in occupational social class and later-life health and life satisfaction.

#### *Self-rated health*

The three ordered logistic regression models (N = 1253) predicting self-rated health are shown in Table 3. In the first model, there was no significant association between intergenerational change in social class and self-rated health (Figure 4A). In the second model, there was no significant association between sex-adjusted change in social class and self-rated health. Neither the main effect of sex nor the interaction between change in class and sex significantly predicted self-rated health. In the third model, which further included standardised MHT IQ scores and years of full-time education, there was no significant association between change in social class and self-rated health. Likewise, there was no significant main effect of sex, nor a significant class change by sex interaction effect. Self-rated health was significantly predicted by years of full-time education, but not by MHT IQ scores. Reweighting the analyses in favour of those from lower parental SES groups similarly showed no significant association between change in social class and self-rated health in the fully-adjusted model (Supplementary Material).

---Insert Table 3 around here---

#### *Satisfaction with life*



Table 4 shows the three linear regression models (N = 1253) predicting SWLS total scores. In the first model, there was no significant association between change in social class and SWLS total score (Figure 4B). In the second model, after adjusting for sex, there was likewise no significant association between change in class and SWLS total score. There was no significant main effect of sex, nor a significant class change by sex interaction effect. In the third model, there was no significant association between change in social class and SWLS total score once adjusted for sex, standardised MHT IQ scores and years of full-time education. Likewise, there was no significant association between sex and SWLS total scores, nor a significant interaction effect between change in social class and sex. Neither standardised MHT IQ scores nor years of full-time education significantly predicted SWLS total scores. This pattern of results was observed even after weighting the analyses in favour of those from lower parental SES groups (Supplementary Material).

---Insert Table 4 around here---

---Insert Figure 4 around here---

## **Discussion**

The present study attempts to clarify the association between social mobility and life satisfaction. Previous work in this area has been relatively mixed, with studies observing a positive (Nikolaev & Burns, 2014; Zhao et al., 2017), a negative (Hadjar & Samuel, 2015), or no association (Marshall & Firth, 1999; Zang & de Graaf, 2016) between social mobility and

subjective wellbeing. Furthermore, previous work has often been limited by the availability of detailed social mobility measures and by the wide cross-sectional samples spanning different ages. In contrast, the present study examines the association between the amount of intergenerational social mobility and life satisfaction within a sample of individuals all born in Scotland in 1936. Importantly, life satisfaction was measured around age 78, after a life time of experience, and the interval between measurements of parental and own socioeconomic status was similar across the sample. By also examining the association between social mobility and health, the present study attempts to replicate the previously-observed association between upwards mobility and better subjective health (e.g., Power et al., 1999; Luo & Waite, 2005) and to extend this association to subjective life satisfaction.

#### *SES, social mobility and life satisfaction*

Life satisfaction at age 78 was not significantly predicted by either intergenerational change in SES or SES at a specific point in the life course. This finding is consistent with cross-sectional work, particularly a recent study by Zang and de Graaf (2016) showing no significant association between intergenerational social mobility and happiness in a combined sample covering three waves of Chinese social survey data (see also Marshall & Firth, 1999). The results presented here provide evidence against a direct causal relationship between economic wealth and subjective wellbeing (e.g., Diener & Seligman, 2004; Diener et al., 2013). However, they are consistent with previous work demonstrating that the majority of life satisfaction is not directly determined by objective measures of economic success (e.g., Johnson & Krueger, 2006; Bjørnskov, Dreher, Fischer, Schnellenbach, & Gehring, 2013). Indeed, in the UK, recent national estimates of life satisfaction show no significant change between 2015 and 2016

despite a reduction in the unemployment rate and an increase in per capita gross domestic product (Office for National Statistics, 2016). Instead, subjective measures of economic success may prove more important determinants of life satisfaction (Johnson & Krueger, 2006). Similarly, subjective health may form a large part of an individual's overall sense of wellbeing (Arrindell, Meeuwesen, & Huyse, 1991). Indeed, in the present study we observed a significant and strong correlation between self-rated health and life satisfaction.

Heller, Watson, and Ilies (2004) suggest that life satisfaction is determined by a combination of top-down psychological effects and domain-specific satisfaction effects. That is, individual differences in the overall sense of life satisfaction result from both the different environmental circumstances experienced by individuals and their different personalities and temperaments. Johnson and Krueger (2006) have further implicated genetic influences in the top-down component of life satisfaction by examining a sample of American twins. They suggest that such genetic contributions help to set the 'baseline' level of life satisfaction, which can then be maintained through economic success. Where life satisfaction is threatened, for example by ill-health, higher material circumstances may help to mitigate any effects. A similar mechanism of resilience to detrimental events has been put forward to explain the association between SES and health (Adler & Snibbe, 2003).

Satisfaction with life at age 78 was also not predicted by childhood cognitive ability or education. These two cognitive variables have been shown to predict intergenerational social mobility (Deary, Taylor, Hart, Wilson, Davey Smith, Blane, & Starr, 2005); therefore, it is possible that these exhibit only indirect effects on life satisfaction. Consistent with this interpretation, both childhood cognitive ability and education (independently) predicted upwards social mobility but did not predict additional variance in life satisfaction when entered after social mobility. Although the possibility of a mediation effect is perhaps not

relevant to life satisfaction, given the lack of an association with social mobility or SES, it may prove fruitful for further understanding the association between SES and health.

### *SES, social mobility and self-rated health*

As with life satisfaction, self-rated health was not significantly predicted by intergenerational social mobility. However, consistent with previous work (Adler et al, 1994; Kunst, Geurts, & van den Berg, 1995; Bobak, Pikhart, Hertzman, Rose, & Marmot, 1998; Kawachi, Kennedy, & Glass, 1999; Laaksonen, Rahkonen, Martikainen, & Lahelma, 2005), individuals with a higher occupational social class at adulthood reported significantly better health at age 78 (see also Power, Matthews, & Manor, 1996). This suggests that the destination, rather than the trajectory, may be important for understanding inequalities in subjective health. Note that the importance of higher adult socioeconomic status has also been demonstrated for more objective measures of health, including the number of functional limitations and long-term conditions (e.g., Luo & Waite, 2005).

Better self-rated health at age 78 was significantly predicted by more years of full-time education. This association is in line with reports from previous studies of self-rated health (Kunst et al., 1995; Bobak et al., 1998). Notably, in the present study we treat education and SES as separate factors. In previous work, particularly from the field of economics, there has been a tendency to include education as a component measure of SES (e.g., Adams, Hurd, McFadden, Merrill, & Ribeiro, 2003; Adler & Snibbe, 2003; Luo & Waite, 2005). The rationale is somewhat logical, as education can constrain access to economic success. For example, there are some occupations, and consequently some occupational social classes, that can only be

attained with sufficient education. However, educational attainment itself is gated by cognitive ability during childhood (e.g., Neisser et al., 1996). Furthermore, Bobak et al. (1998) have demonstrated that the association between education and self-rated health is not attenuated when adjusting for SES, suggesting somewhat independent effects.

### *Limitations of the study*

The sample included very few individuals whom were in unskilled occupations later in life. This may be explained by the sampling bias in each of the follow-up studies; those with low SES were unable or unwilling to participate in follow-up. For example, due to the increased risk of mortality associated with lower SES in adulthood (e.g., Davey Smith et al., 1997), these individuals may have died prior to follow-up and inclusion in the sample. This under-representation may have led to the relatively high SWLS scores and high health ratings, and the limited number of downwards moves. Indeed, the dropout of lower SES individuals may have a similar effect to the ‘differential mortality’ described by Segerstrom, Combs, Winning, Boehm, and Kubzansky (2016), in which high ratings of subjective wellbeing in later life are caused in part by the death of the least satisfied individuals prior to follow-up. However, the lack of downward moves may also be a product of the trend for upward absolute social mobility in the UK over the 20<sup>th</sup> century – i.e., the population-wide tendency to increase one’s social class relative to one’s parents – as a result of the move away from the industrialised economy of the previous generation (Goldthorpe, 2013). Either way, these issues of representativeness may be resolved through population-wide data linkage initiatives, which enable more frequent measurement of SES across the life course, including immediately before death, and the comparison of social mobility trajectories between generations.

Furthermore, as the association between income and life satisfaction is stronger in poorer nations (Diener & Oishi, 2000; Veenhoven, 1991), it remains possible that social mobility is more important for later-life satisfaction in other nations.

Just as the present study may have underrepresented individuals with lower socioeconomic destinations, it may have also underrepresented those with lower socioeconomic origins. To obtain the analytical sample, we removed individuals with missing data, individuals whom had died prior to follow-up, and individuals with whom contact had been lost. As a result, the analytic sample were almost a standard deviation higher in childhood cognitive ability, and were from more affluent social classes in childhood than the full combined sample (see Supplementary Material). As in adulthood, this underrepresentation of lower childhood social classes may arise from an increased risk of mortality (e.g., Mare, 1990) and a decreased likelihood of participating in follow-up studies (Johnson, Brett, Calvin, & Deary, 2016). Removing these individuals has two important implications for the present study. Firstly, those from the lowest childhood social classes have the greatest potential for upwards social mobility; by underrepresenting these individuals it is possible that we underestimate the contribution of intergenerational social mobility to later-life health and life satisfaction. However, the contribution of social mobility to later-life outcomes was broadly similar when reanalysing the data to give more weight to those from lower childhood social classes (Supplementary Material). That is, the amount of social mobility experienced was not significantly associated with SWLS scores, or with self-rated health when adjusted for cognitive ability and education. The second implication is that these removed individuals may also show the greatest life satisfaction in later-life. In the analytic sample, childhood cognitive ability and education was not significantly associated with life satisfaction in older age. However, we may underestimate these associations due to the removal of individuals with lower cognitive ability

and less education as part of the cleaning process. As these individuals were removed due to missing data, it is impossible to tell the degree to which they differ from the retained sample in terms of later-life outcomes.

The present study is also limited by the use of a single measure – occupational social class – as an indicator of SES. Some previous work has used several measures of SES (e.g., Marmot & Shipley, 1996; Davey Smith et al., 1997), and given the breadth of different aspects to SES a compound measure is often recommended (Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006). Similarly, while we have shown no significant association between intergenerational change in occupational social class and life satisfaction, previous studies have had some success with other indicators of social mobility. For example, Boehm, Chen, Williams, Ryff, and Kubzansky (2015) report a significant association between intergenerational change in educational achievement and life satisfaction in a cross-sectional American sample. Note, however, that education is strongly associated with cognitive ability (Neisser et al., 1996), and so intergenerational differences in educational achievement are likely mediated by one's own cognitive ability. Regardless, use of other indicators of SES or more comprehensive compound measures may yet demonstrate significant associations between SES and later-life satisfaction. Finally, by focusing on the occupational status of individuals, it is possible that the present study misses out on important social factors such as material deprivation or overcrowding (see Galobardes et al., 2006).

### *Conclusions*

In a sample of Scottish individuals born in 1936, life satisfaction at age 78 was not associated with either an individual's socioeconomic status origin (at childhood) or their socioeconomic

status destination. Furthermore, moving up in social class from that of one's parents did not appear to make individuals more satisfied in their later lives. This finding extends previous work by examining social mobility in a nationally-representative single-year birth cohort, and by measuring satisfaction after a lifetime of experience. However, the lack of an association with life satisfaction does not mean that socioeconomic status and its intergenerational change should be ignored, as higher socioeconomic status at adulthood does appear to confer some benefits to self-rated health in later life.



## References

- Adams, P., Hurd, M.D., McFadden, D., Merrill, A., Ribeiro, T. (2003). Healthy, wealthy, and wise? Tests for direct causal paths between health and socioeconomic status. *Journal of Economics*, 112, 3-56.
- Adler, N.E., Boyce, T., Chesney, M.A., Cohen, S., Folkman, S., Kahn, R.L., & Syme, S.L. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist*, 49(1), 15-24.
- Adler, N.E., & Snibbe, A.C. (2003). The role of psychosocial processes in explaining the gradient between socioeconomic status and health. *Current Directions in Psychological Science*, 12(4), 119-123.
- Angell, M. (1993). Privilege and health – What is the connection? *The New England Journal of Medicine*, 329(2), 126-127.
- Arrindell, W.A., Meeuwesen, L., & Huyse, F.J. (1991). The Satisfaction With Life Scale (SWLS): Psychometric properties in a non-psychiatric medical outpatients sample. *Personality and Individual Differences*, 12, 117-123.
- Bjørnskov, C., Dreher, A., Fischer, J.A.V., Schnellenbach, J., & Gehring, K. (2013). Inequality and happiness: When perceived social mobility and economic reality do not match. *Journal of Economic Behavior & Organization*, 91, 75-92.
- Bobak, M., Pikhart, H., Hertzman, C., Rose, R., & Marmot, M. (1998). Socioeconomic factors, perceived control and self-reported health in Russia: A cross-sectional survey. *Social Science and Medicine*, 47(2), 269-279.

Boehm, J.K., Chen, Y., Williams, D.R., Ryff, C., & Kubzansky, L.D. (2015). Unequally distributed psychological assets: Are there social disparities in optimism, life satisfaction, and positive affect? *PLoS One*, 10(2), e0118066.

Brett, C.E., & Deary, I.J. (2014). Realising health data linkage from a researcher's perspective: Following up the 6-Day Sample of the Scottish Mental Survey 1947. *Longitudinal and Life Course Studies*, 5, 283-298.

Davey Smith, G., Hart, C., Blane, D., Gillis, C., & Hawthorne, V. (1997). Lifetime socioeconomic position and mortality: Prospective observational study. *BMJ*, 314, 547.

Deary, I.J., Taylor, M.D., Hart, C.L., Wilson, V., Davey Smith, G., Blane, D., & Starr, J.M. (2005). Intergenerational social mobility and mid-life status attainment: Influences of childhood intelligence, childhood social factors, and education. *Intelligence*, 33, 455-472.

Deary, I.J., Gow, A.J., Taylor, M.D., Corley, J., Brett, C., Wilson, V., ..., & Star, J.M. (2007). The Lothian Birth Cohort 1936: A study to examine influences on cognitive ageing from age 11 to age 70 and beyond. *BMC Geriatrics*, 7, 28.

Deary, I.J., & Brett, C.E. (2015). Predicting and retrodicting intelligence between childhood and old age in the 6-Day Sample of the Scottish Mental Survey 1947. *Intelligence*, 50, 1-9.

Diener, E., Emmons, R.A., Larsen, R.J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment*, 49(1), 71-75.

Diener, E., & Oishi, S. (2000). Money and happiness: Income and subjective well-being across nations. In E. Diener & D.M. Suh (Eds.), *Culture and subjective well-being* (pp. 185-218). Cambridge, MA: MIT Press.

Diener, E., & Seligman, M.E.P. (2004). Beyond money: Toward an economy of well-being.

*Psychological Science in the Public Interest*, 5, 1-31.

Diener, E., Kahneman, D., Tov, W., & Arora, R. (2010). Income's association with judgements of life versus feelings. In E. Diener, D. Kahneman, & J.F. Helliwell (Eds.), *International differences in well-being* (pp. 3-15). Oxford, UK: Oxford University Press.

Diener, E., Ng, W., Harter, J., & Arora, R. (2010). Wealth and happiness across the world: Material prosperity predicts life evaluation, whereas psychosocial prosperity predicts positive feeling. *Journal of Personality and Social Psychology*, 99(1), 52-61.

Diener, E., Tay, L., & Oishi, S. (2013). Rising income and the subjective well-being of nations. *Journal of Personality and Social Psychology*, 104(2), 267-276.

Evans, G.W., & Kim, P. (2010). Multiple risk exposure as a potential explanatory mechanism for the socioeconomic status-health gradient. *Annals of the New York Academy of Sciences*, 1186, 174-189.

Feinstein, J.S., (1993). The relationship between socioeconomic status and health: A review of the literature. *The Milbank Quarterly*, 71(2), 279-322.

Galobardes, B., Shaw, M., Lawlor, D.A., Lynch, J.W., & Davey Smith, G. (2006). Indicators of socioeconomic position (part 1). *Journal of Epidemiology & Community Health*, 60, 7-12.

General Register Office (1956). *Census, 1951: Classification of occupations*. London: HMSO.

Goldman, N., 2001. Social inequalities in health: disentangling the underlying mechanisms. In: Weinstein, M., Hermalin, A. (Eds.), *Strengthening the Dialogue between Epidemiology and Demography*. New York: Annals of the New York Academy of Sciences.

Goldthorpe, J.H. (2013). Understanding – and misunderstanding – social mobility in Britain: The entry of the economists, the confusion of politicians and the limits of educational policy. *Journal of Social Policy*, 42(3), 431-450.

Graham, H. (2002). Building an inter-disciplinary science of health inequalities: The example of lifecourse research. *Social Science & Medicine*, 55, 2005-2016.

Hadjar, A., & Samuel, R. (2015). Does upward social mobility increase life satisfaction? A longitudinal analysis using British and Swiss panel data. *Research in Social Stratification and Mobility*, 39, 48-58.

Heller, D., Watson, D., and Ilies, R. (2004). The role of person versus situation in life satisfaction: A critical examination. *Psychological Bulletin*, 130(4), 574-600.

Heraclides, A., & Brunner, E. (2010). Social mobility and social accumulation across the life course in relation to adult overweight and obesity: The Whitehall II study. *Journal of Epidemiology & Community Health*, 64, 714-719.

House, J., Kessler, R.C., & Herzog, A.R. (1990). Age, socioeconomic status, and health. *The Milbank Quarterly*, 68(3), 383-411.

Johnson, W., & Krueger, R.F. (2006). How money buys happiness: Genetic and environmental processes linking finances and life satisfaction. *Journal of Personality and Social Psychology*, 90(4), 680-691.

Johnson, W., Brett, C.E., Calvin, C., & Deary, I.J. (2016). Childhood characteristics and participation in Scottish Mental Survey 1947 6-Day Sample follow-ups: Implications for participation in aging studies. *Intelligence*, 54, 70-79.

Kawachi, I., Kennedy, B.P., & Glass, R. (1999). Social capital and self-rated health: A contextual analysis. *American Journal of Public Health, 89*(8), 1187-1193.

Krieger, N., Williams, D.R., & Moss, N.E. (1997). Measuring social class in US public health research: Concepts, methodologies, and guidelines. *Annual Review of Public Health, 18*, 341-378.

Kunst, A.E., Geurts, J.J.M., & van den Berg, J. (1995). International variation in socioeconomic inequalities in self reported health. *Journal of Epidemiology and Community Health, 49*, 117-123.

Laaksonen, M., Rahkonen, O., Martikainen, P., & Lahelma, E. (2005). Socioeconomic position and self-rated health: The contribution of childhood socioeconomic circumstances, adult socioeconomic status, and material resources. *American Journal of Public Health, 95*, 1403-1409.

Lindsay, C. (2003). A century of labour market change: 1900 to 2000. *Labour Market Trends, 111*(3), 133-144.

Luo, Y., & Waite, L.J. (2005). The impact of childhood and adult SES on physical, mental, and cognitive well-being in later life. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 60*(2), S93-S101.

Luo, Y., & Wen, M. (2002). Can we afford better health? A study of the health differentials in China. *Health, 6*, 471-500.

Lynch, J.W. (2000). Socioeconomic factors in the behavioral and psychosocial epidemiology of cardiovascular disease. In N. Schneiderman, J. Gentry, J. M. da Silva, M. Speers, & H. Tomes

(Eds.), *Integrating behavioral and social sciences with public health*. Washington, D.C.:

American Psychological Association.

MacPherson, J.S. (1958). *Eleven-year-olds grow up*. London: University of London Press.

Mare, R.D. (1990). Socioeconomic careers and differential mortality among older men in the United States. In J. Vallin, S. D'Souza, & A. Palloni (Eds.), *Measurement and analysis of mortality: New approaches* (pp. 362–387). New York: Clarendon Press.

Marmot, M.G., & Shipley, M.J. (1996). Do socioeconomic differences in mortality persist after retirement? 25 year follow up of civil servants from the first Whitehall study. *BMJ*, 313, 117-1180.

Marmot, M., Shipley, M., Brunner, E., & Hemingway, H. (2001). Relative contribution of early life and adult socioeconomic factors to adult morbidity in the Whitehall II Study. *Journal of Epidemiology & Community Health*, 55, 301-307.

Marshall, G., & Firth, D. (1999). Social mobility and personal satisfaction: Evidence from ten countries. *British Journal of Sociology*, 50(1), 28-48.

Maxwell, J. (1969). *Sixteen years on: A follow-up of the 1947 Scottish Mental Survey*. London: University of London Press.

Neisser, U., Boodoo, G., Bouchard Jr., T.J., Boykin, A.W., Brody, N., Ceci, S.J.,... & Urbina, S. (1996). Intelligence: Knowns and unknowns. *American Psychologist*, 51(2), 77-101.

Nikolaev, B., & Burns, A. (2014). Intergenerational mobility and subjective well-being: Evidence from the general social survey. *Journal of Behavioural and Experimental Economics*, 53, 82-96.

Office of Population Censuses and Surveys (1980). *Classification of occupations 1980*. London: HMSO.

Office for National Statistics (2016). *Personal well-being in the UK: Oct 2015 to Sept 2016*. London: Office for National Statistics.

Pavot, W., & Diener, E. (1993). Review of the Satisfaction With Life Scale. *Psychological Assessment, 5*, 164-172.

Power, C., Matthews, S., & Manor, O. (1996). Inequalities in self rated health in the 1958 birth cohort: Lifetime social circumstances or social mobility? *BMJ, 313*, 449-453.

Power, C., Manor, O., & Matthews, S. (1999). The duration and timing of exposure: Effects of socioeconomic environment on adult health. *American Journal of Public Health, 89*(7), 1059-1065.

R Core Team (2016). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing.

Revelle, W. (2016). *psych: Procedures for personality and psychological research*. Evanston, Illinois: Northwestern University.

The Scottish Council for Research in Education (1949). *The trend of Scottish intelligence*. London: University of London Press.

The Scottish Council for Research in Education (1953). Social implications of the 1947 Scottish Mental Survey. London: University of London Press.

Scottish Government (2010). *Equally well review 2010: Report by the ministerial task force on implementing equally well, the early-years framework and achieving our potential*. Edinburgh: Scottish Government.

Segerstrom, S.C., Combs, H.L., Winning, A., Boehm, J.K., & Kubzansky, L.D. (2016). The happy survivor? Effects of differential mortality on life satisfaction in older age. *Psychology and Aging, 31*(4), 340-345.

Social Mobility Commission (2016). *State of the nation 2016: Social mobility in Great Britain*. London: Social Mobility Commission.

Turrell, G., Lynch, J.W., Kaplan, G.A., Everson, S.A., Helkala, E.-L., Kauhanen, J., & Salonen, J.T. (2002). Socioeconomic position across the lifecourse and cognitive function in late middle age. *Journal of Gerontology: Social Sciences, 57B*(1), S43-S51.

UK Government (2011). *Opening doors, breaking barriers: A strategy for social mobility*. London: Cabinet Office.

Veenhoven, R. (1991). Is happiness relative? *Social Indicators Research, 24*, 1-34.

Venables, W.N., & Ripley, B.D. (2002). *Modern applied statistics with S* (4<sup>th</sup> ed.). New York: Springer.

Wickham, H. (2009). *ggplot2: Elegant graphics for data analysis*. New York: Springer-Verlag.

Zang, E., & de Graaf, N.D. (2016). Frustrated achievers or satisfied losers? Inter- and intragenerational social mobility and happiness in China. *Sociological Science, 3*, 779-800.



Zhao, Y., Li, Y., Heath, A., Shryane, N. (2017). Inter- and intra-generational social mobility effects on subjective well-being: Evidence from mainland China. *Research in Social Stratification and Mobility*, 48, 54-66.

Table 1. Own adult occupational social class according to father's occupational social class. Numbers show the frequency of each corresponding category. Cells are coloured to show mean SWLS total scores for each social mobility category; from red (lower SWLS scores) to blue (higher SWLS scores). Cells with  $N \leq 5$  are suppressed as part of disclosure control, and are coloured in white.

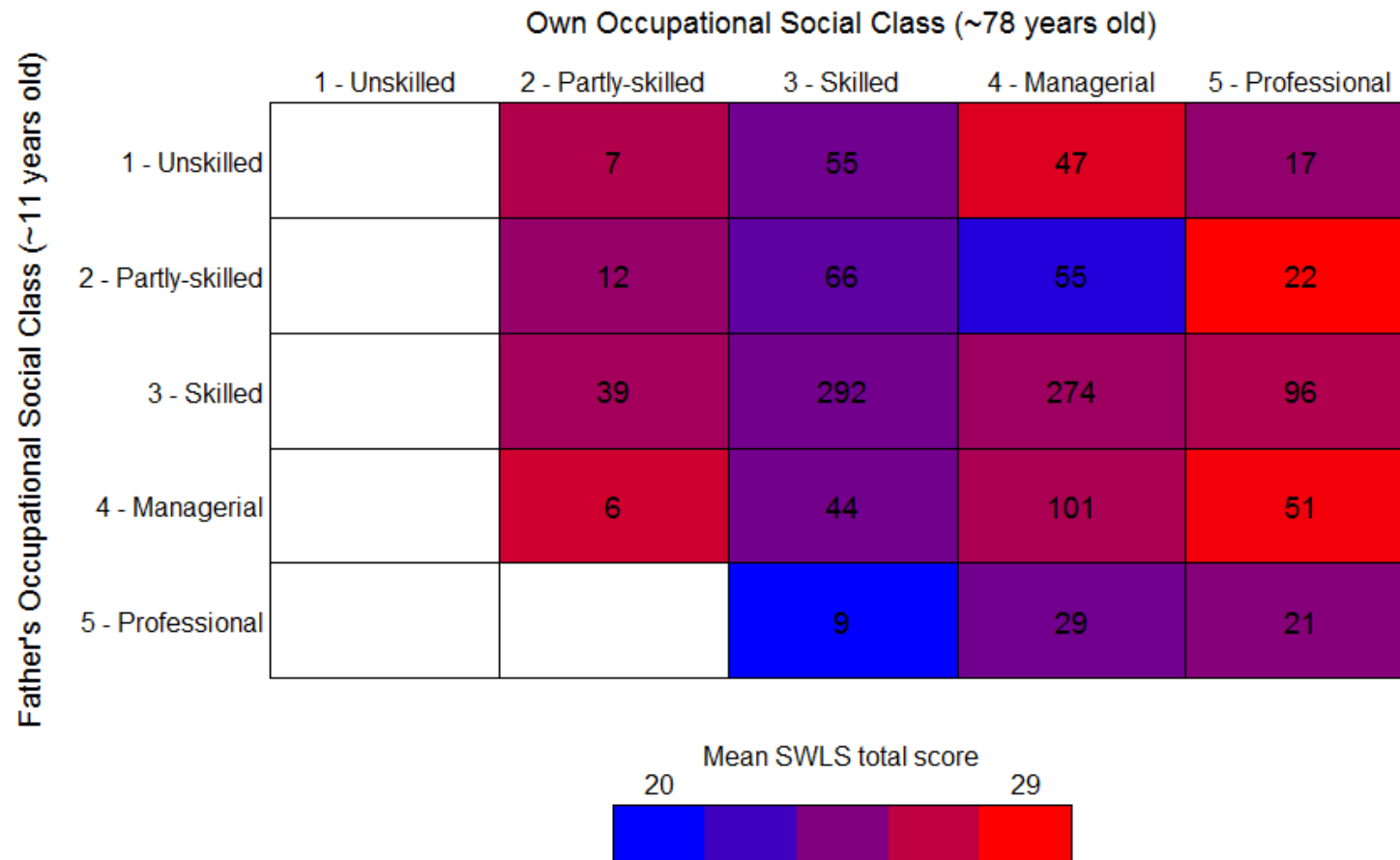


Table 2. Descriptive statistics according to sex.

	Male (N = 656)		Female (N = 599)		Total (N = 1255)	
	Mean	SD	Mean	SD	Mean	SD
Raw MHT score (max = 76)	47.57	12.72	50.23	10.52	48.84	11.79
Full time education (years)	11.08	2.04	10.96	1.49	11.08	1.80
SWLS total score (max = 35)	25.93	5.86	25.84	5.82	25.89	5.84
Health number (%) 1/2/3/4/5	1/9/27/44/19		1/5/26/52/16		1/7/27/48/17	
Amount of Change in Social Class (%) -3/-2/-1/0/1/2/3/4	0/2/10/35/29/17/5/2		0/2/8/33/35/15/6/1		0/2/9/34/32/16/6/1	

Table 3. Odds ratios (OR) showing the odds of better self-rated health associated with a single unit intergenerational increase in social class, with being female, with the interaction between sex (female) and increasing social class, with a one standard deviation increase in MHT IQ scores, and with a one-year increase in full-time education (N = 1253). Predictors are entered in a stepwise fashion.

	Social Mobility			Adjusted for Sex			Adjusted for Cognitive Ability + Education		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Change in class	1.06	0.97-1.16	0.196	1.08	0.96-1.22	0.213	1.04	0.92-1.17	0.537
Sex (Female)	-	-	-	1.14	0.89-1.46	0.304	1.10	0.86-1.41	0.459
Sex X Change in class	-	-	-	0.96	0.80-1.16	0.675	0.99	0.83-1.20	0.944
MHT IQ scores	-	-	-	-	-	-	1.11	0.99-1.24	0.072
Full time education	-	-	-	-	-	-	1.14	1.07-1.21	<0.001

Table 4. Odds ratios (OR) showing the odds of higher SWLS scores associated with a single unit intergenerational increase in social class, with being female, with the interaction between sex (female) and increasing social class, with a one standard deviation increase in MHT IQ scores, and with a one-year increase in full-time education (N = 1253). Predictors are entered in a step-wise fashion.

	Social Mobility			Adjusted for Sex			Adjusted for Cognitive Ability + Education		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Change in class	1.19	0.89-1.58	0.234	1.14	0.78-1.66	0.515	1.12	0.76-1.65	0.560
Sex (Female)	-	-	-	0.83	0.38-1.81	0.647	0.85	0.39-1.86	0.686
Sex X Change in class	-	-	-	1.11	0.63-1.97	0.720	1.13	0.63-2.00	0.681
MHT IQ scores	-	-	-	-	-	-	0.91	0.64-1.28	0.590
Full time education	-	-	-	-	-	-	1.10	0.91-1.33	0.346

Figure 1. Selection of study sample. The final sample consisted of individuals whom provided valid measures of occupational social class (at childhood and adulthood), life satisfaction (at later-life), self-rated health (at later-life), and cognitive ability (at childhood).

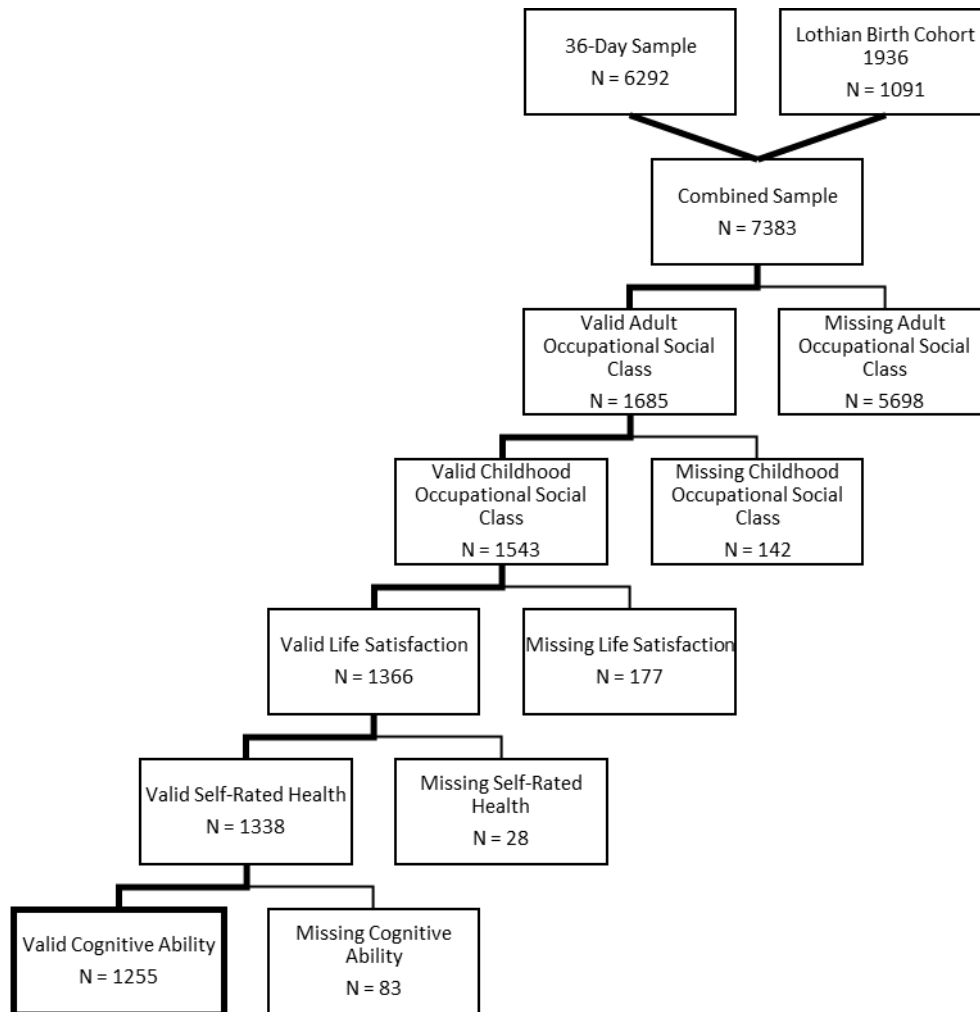


Figure 2. Frequency distributions for self-rated health (A) and Satisfaction with Life Scale total score (B).

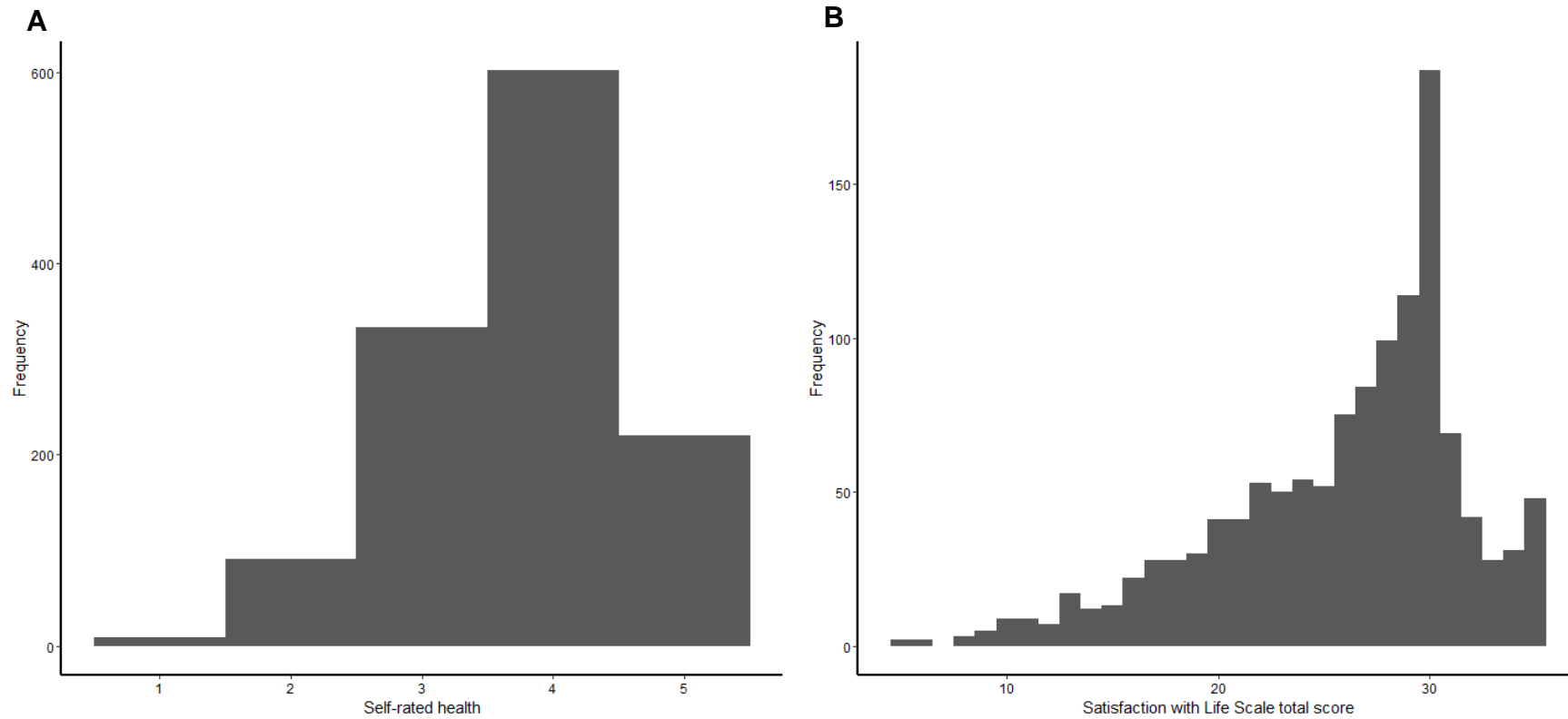


Figure 3. Mean self-rated health scores according to father's (A) and own (B) socioeconomic status, and mean Satisfaction With Life Scale (SWLS)

total scores according to father's (C) and own (D) socioeconomic status. Lines represent  $\pm 1$  SE.

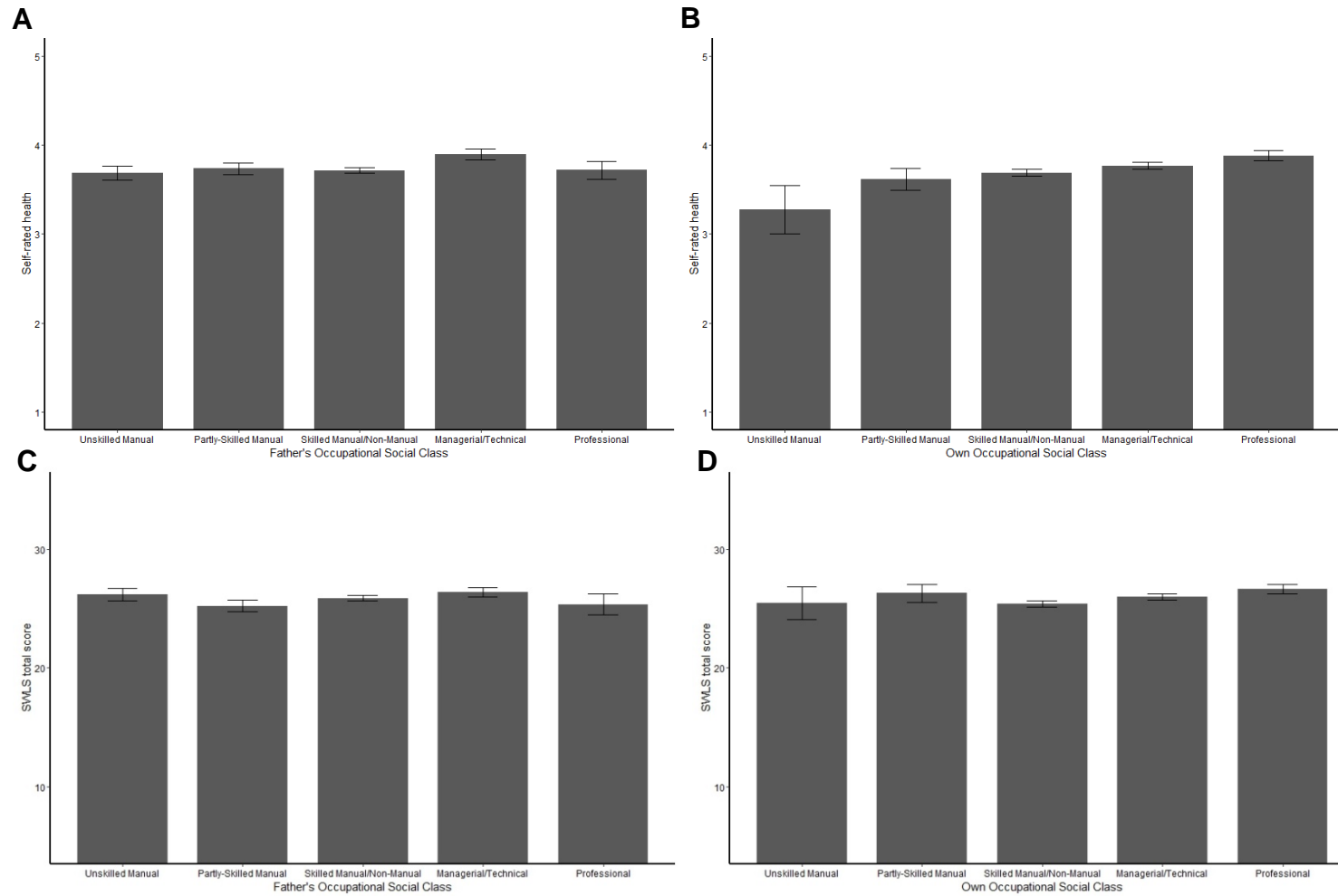




Figure 4. Mean self-rated health (A) and Satisfaction With Life Scale (SWLS) total scores (B) according to the amount of intergenerational change experienced between father's and own occupational social class. Those with a -3 change in occupational social class (N = 2) are not shown. Lines represent +/- 1 SE.

